



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,798	11/14/2001	Jeffrey P. Grossman	0050.2025-001	3088

21005 7590 08/05/2004

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

EXAMINER

MCLEAN MAYO, KIMBERLY N

ART UNIT	PAPER NUMBER
2187	

DATE MAILED: 08/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,798

Applicant(s)

GROSSMAN ET AL.

Examiner

Kimberly N. McLean-Mayo

Art Unit

2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 17-42, 45 and 47-65 is/are rejected.
- 7) ☒ Claim(s) 15, 16, 43, 44 and 46 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2187

DETAILED ACTION

1. The enclosed detailed action is in response to the Information Disclosure Statement and the Application submitted on November 14, 2001.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 7-8, 12, 14, 17-18, 20-22, 24-32, 35-36, 40, 42, 45, 48-50 and 52-65 are rejected under 35 U.S.C. 102(b) as being anticipated by Beier (USPN: 5,933,820).

Regarding claims 1-2, 8, 21-22, 29-30, 36, 50, 57, 60 and 62, Beier discloses a memory for storing objects, the data objects being referenced by pointers (C 8, L 41-45); and a short-quasi-unique-identifier (SQUID) generator which generates SQUIDs [comprised of a unique identifier and a reorganization number] for newly allocated data objects to be stored in the memory segment (C 6, L 25-30; C 12, L 22-25, L 34-39), pointers to a particular data object [target segment] being associated with the data object's SQUID (C 6, L 55-63); a memory allocator which allocates a segment of the memory to a data object (inherent – all memory systems comprise hardware/software control operations to assign/allocate memory to store a data object). Additionally, regarding claims 60 and 62 refer to C 16, L 5-17; C 19, L 18-31 and C 20, entire.

Art Unit: 2187

Regarding claims 3 and 31, Beier discloses if the data object is moved to a second allocated memory segment, placing a pointer to the second allocated memory segment at the original memory segment (C 13, L 42-44).

Regarding claims 4 and 32, Beier discloses the data object is moved (relocated) due to resizing (C 2, L 4-9).

Regarding claims 7 and 35, Beier discloses moving the data object due to data compaction (C 2, L 32-39 – related data objects are compacted by clustering).

Regarding claims 12, 14, 40, 42, 58, 61 and 63, Beier discloses a comparator which compares SQUIDs associated with two different pointers, wherein the comparator determines that the two pointers do not reference the same data object if the SQUIDs [pointer value is invalid] are different; and wherein the comparator determines that the two pointers reference the same data object if the SQUIDs are identical [pointer value is valid] and address fields of the two pointers are identical (C 6, L 63-67; C 7, L 1-12; C 11, L 15-27).

Regarding claims 17 and 45, Beier discloses migration indicators [reorganization numbers] associated with the pointers, a migration indicator indicating a number of migrations of a data object referenced by an associated pointer prior to the pointer being created (C 6, L 53-60; C 9, L 27-29); and a comparator which determines that the two pointers do not reference the same data object [pointer is valid] if their associated migration indicators indicate identical numbers of

Art Unit: 2187

migration and their corresponding addresses are different (C 6, L 63-67; C 7, L 1-12; C 11, L 15-27).

Regarding claims 18, 25-26 and 53-54, Beier discloses the migration indicator comprising one bit (the indicator is a count value which is comprised of plural bits and thus comprises bit one).

Regarding claims 20, 27, 48 and 55, Beier discloses the DBMS generating and managing the SQUID, however, software does not operation alone. It must be executed on hardware and thus hardware is used to implement the SQUID.

Regarding claims 21, 28, 49 and 56, Beier disclose the SQUID is implemented by software (Abstract- the DBSM generates and manages the SQUID; and the DBMS is software (C 8, L 52-55).

Regarding claims 24, 52, 59 and 64-65, Beier discloses memory for storing data objects (C 8, L 41-45); pointers to data objects stored in the memory (C 18, L 58-67; C 19, L 1-12); migration indicators [reorganization numbers] associated with the pointers, a migration indicator indicating a number of migrations of a data object referenced by an associated pointer prior to the pointer being created (C 6, L 53-60; C 9, L 27-29); and a comparator which determines that the two pointers do not reference the same data object [pointer is valid] if their associated migration indicators indicate identical numbers of migration and their corresponding addresses are different

Art Unit: 2187

(C 6, L 63-67; C 7, L 1-12; C 11, L 15-27). Additionally, regarding claims 64 and 65 refer to C 16, L 5-17; C 19, L 18-31 and C 20, entire.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of Black (USPN: 5,325,524).

Beier discloses the limitations cited above, however, Beier does not disclose moving the data object from a first memory to a second memory within a distributed system. Black teaches moving a data object from a first memory [C 4, L 44-57 - storesite] to a second memory [C 4, L 44-57 - storesite] within a distributed system (Figure 2, C 4, L 44-45)(C 6, L 1-35). This feature taught by Black allows data sharing in a multi-node system by forwarding the data to a different node. Hence, it would have been obvious to one of ordinary skill in the art to use Black's teachings with the system taught by Beier in a multi-node system for the desirable purpose of providing data sharing thereby improving the performance of the system.

6. Claims 6 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of Flood (USPN: 6,560,619).

Art Unit: 2187

Beier discloses the limitations cited above, however, Beier does not disclose moving the data object due to garbage collection. Flood discloses moving data objects when performing garbage collections (C 3, L 25-52). This feature allows compaction of data which increases cache hits and thus improves the performance of the system. Hence, it would have been obvious to one of ordinary skill in the art to use Flood's teachings with the system taught by Beier for the desirable purpose of improved performance.

7. Claims 9 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of DiLullo (USPN: 5,025,253).

Beier discloses the limitations cited above, however, Beier does not disclose generating the SQUID by counting. DiLullo teaches the concept of generating a unique identifier via the use of a counter (C 7, L 17-21). This feature provides a simple method for generating unique identifiers. Hence, it would have been obvious to one of ordinary skill in the art to use DiLullo's teachings with to generate the SQUIDs in Beier's system for the desirable purpose of simplicity.

8. Claims 10 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of Armstrong (PGPUB: US 20020175805).

Beier discloses the limitations cited above, however, Beier does not disclose generating the SQUID randomly. Armstrong teaches randomly generating identifiers to ensure uniqueness Section [0062, lines 8-10]. Beier discloses the use of unique identifier but does not indicate how the identifiers are generated unique. Hence, it would have been obvious to one of ordinary skill

Art Unit: 2187

in the art to use Armstrong's teachings with the teachings of Beier for the desirable purpose of providing an efficient means to generate unique identifiers.

9. Claims 11 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of O'Hare (PGPUB: US 20010027501).

Beier discloses the limitations cited above, however, Beier does not disclose generating the SQUID by hashing. O'Hare discloses generating a unique identifier via hashing (Section [0067, lines 1-3]). This feature taught by O'Hare provides an efficient means for generating unique identifiers. Hence, it would have been obvious to one of ordinary skill in the art to use O'Hare's teachings with the system taught by Beier for the desirable purpose of efficiency.

10. Claims 13 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of the submitted prior art Luk ("Memory Forwarding :Enabling Aggressive Layout).

Beier discloses the limitations cited above, however, Beier does not disclose a mechanism for reordering instructions wherein the mechanism is responsive to a comparator. However, Luk teaches this feature (refer to Section 3.2 - Data Dependence Speculation). This feature improves performance by reducing data conflicts. Hence, it would have been obvious to one of ordinary skill in the art to use Luk's teachings with the system taught by Beier for the desirable purpose of improved performance.

Art Unit: 2187

11. Claims 19 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820) in view of the submitted prior art Carter (USPN: 5,845,331).

Beier discloses the limitations cited above, however, Beier does not disclose using a guarded pointer. Carter teaches the use of guarded pointers to protect memory segments (Abstract).

Hence, it would have been obvious to one of ordinary skill in the art use guarded pointers in Beier system for the desirable purpose of memory protection.

12. Claims 23 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beier (USPN: 5,933,820).

Beier discloses the limitations cited above, however, Beier does not disclose caching SQUIDs for recently used pointers. However, caching recently used data/information is well known in the art. This feature allows fast access to the information by bypassing accesses to slower memory. Hence, it would have been obvious to one of ordinary skill in the art to cache the SQUIDs of recently used pointers in Beier's system for the desirable purpose of improving the performance of the system.

Allowable Subject Matter

13. Claims 15-16, 43-44 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2187

Conclusion

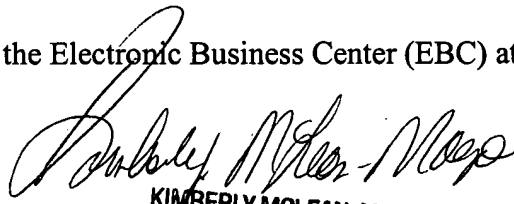
14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Martin – JP 09034823 – determining if two object references are referencing the same object.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 703-308-9592. The examiner can normally be reached on M (10:00 - 6:30); Tues, Thr (10:00 - 4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 703-308-1756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KIMBERLY MCLEAN-MAYO
PRIMARY EXAMINER

Kimberly N. McLean-Mayo
Examiner
Art Unit 2187

KNM

August 2, 2004